

**We claim:**

1. A wireless communication system, comprising:

a plurality of mobile devices;

5 a local area network (LAN); and

a plurality of local base stations coupled to the LAN, wherein each local base station has a unique address on the LAN and is configured to (a) transmit and receive data packets to and from the mobile devices and (b) transfer the data packets between local base stations over the LAN using the unique address.

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2. A wireless communication system, comprising:

a plurality of mobile devices;

a local area network (LAN);

15 a plurality of local base stations coupled to the LAN, wherein each local base station has a unique address on the LAN and is configured to transmit and receive data packets to and from the mobile devices and transfer the data packets between local base stations over the LAN using the unique address; and

a subscription server operating on the LAN that stores data identifying the unique address of the local base station covering each of the mobile devices,  
20 wherein the subscription server enables the local base stations to locate any one of the mobile devices.

3. The wireless communication system of claim 2, wherein the unique address is an IP address.

5 4. The wireless communication system of claim 2, further comprising:

a redirection software module operating on the LAN and having access to a wide-area wireless network, and that is configured to (a) send and receive data packets over the wide-area wireless network to and from mobile devices that are not within range of any of the local base stations, and (b) transfer data packets to  
10 and from the local base stations over the LAN;

wherein the subscription server also enables the redirection software to locate which local base station is covering any one of the mobile devices.

5. The wireless communication system of claim 4, wherein the redirection  
15 software module has access to the wide-area wireless network over a wide-area computer network.

6. The wireless communication system of claim 4, wherein the wide-area computer network is the Internet.

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7. The wireless communication system of claim 4, wherein the redirection software module is also configured to combine one or more data packets into an electronic message.

5 8. The wireless communication system of claim 7, wherein the redirection software is also configured to transfer electronic messages into an electronic mailbox.

9. The wireless communication system of claim 5, further comprising:  
10 a mail server operating on the LAN and having access to the wide-area computer network, and that sends and receives data packets to and from the wide-area computer network;

wherein, the redirection software module is also configured to send and receive data packets to and from the mail server.

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10. The wireless communication system of claim 2, wherein the subscription server also logs subscription information for each of the mobile devices in the system.

11. The wireless communication system of claim 10, wherein each local base station includes a subscription list that identifies the mobile devices currently covered by the particular local base station.

5 12. The wireless communication system of claim 11, wherein each subscription list also includes subscription information for the mobile devices currently covered by the particular local base station.

10 13. The wireless communication system of claim 2, wherein each local base station includes a route cache that stores data identifying the unique address of local base stations last known to be covering one or more of the mobile devices.

15 14. The wireless communication system of claim 13, wherein the route cache included in each local base station purges all data relating to any mobile device to which it has not been in communication for a set interval of time.

15. The wireless communication system of claim 2, wherein one or more of the local base stations comprises a modified personal computer (PC).

20 16. The wireless communication system of claim 2, wherein the system operates within an office.

17. A wireless communication system, comprising:

a plurality of mobile devices;

a wide-area computer network (WAN);

5 a plurality of offices, each including a local area network (LAN) coupled to the WAN;

a plurality of local base stations within each office that are coupled to the LAN, wherein each local base station has a unique address on the LAN and WAN and is configured to transmit and receive data packets to and from the mobile  
10 devices and transfer the data packets between local base stations using the unique address;

a plurality of subscription servers, each operating on the LAN of one of the offices, and each configured to log the mobile devices covered by each local base station within the office, wherein the subscriptions servers enable the local  
15 base stations to locate a mobile device within the office; and

a network subscription server operating on the WAN that logs the mobile devices within each office, wherein the network subscription server enables the local base stations to locate which office a mobile device is in.

20 18. The wireless communication system of claim 17, wherein the WAN is the Internet.

19. The wireless communication system of claim 17, further comprising:

a plurality of redirection software modules, each operating on the LAN of one of the offices and having access to a wide-area wireless network, and each  
5 configured to (a) send and receive data packets over the wide-area wireless network to and from mobile devices that are not within range of any of the local base stations, and (b) transfer data packets to and from the local base stations over the LAN;

wherein the plurality of subscription servers and the network subscription  
10 server also enable the redirection software modules to locate mobile devices within the system.

20. The wireless communication system of claim 19, wherein the plurality of redirection software modules have access to the wide-area wireless network over  
15 the WAN.

21. A local base station, comprising:

a central processing unit (CPU)  
a sound card coupled to the CPU and configured to (a) demodulate an  
20 incoming radio frequency (RF) signal to produce an incoming frame of data, and  
(b) generate an outgoing modulated RF signal from an outgoing frame of data;

means for transmitting the outgoing modulated RF signal to one or more of a plurality of mobile devices;

means for receiving the incoming RF signal from one of the plurality of mobile devices;

5           one or more software modules executed by the CPU that are configured to  
(a) extract a packet of data from the incoming frame of data, and encode the  
packet of data into an outgoing datagram, wherein the outgoing datagram includes  
addressing information identifying the location of another local base station on a  
local area network (LAN), and (b) extract a data packet from an incoming  
10   datagram received from the LAN, and encode the data packet into the outgoing  
frame of data, wherein the outgoing frame of data includes transmission  
information that enables the outgoing froma of data to be transmitted to the  
mobile device; and

          a network interface card coupled to the CPU and configured to transmit  
15   the outgoing datagrams to the LAN and receive the incoming datagrams from the  
LAN.

22. The local base station of claim 21, wherein the sound card is a full duplex  
sound card.

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23. The local base station of claim 21, wherein the local base station is constructed using a personal computer (PC) and commercially available components.

5 24. The local base station of claim 21, wherein the packet of data and the data packet are Mobitex MPAKs.

25. The local base station of claim 21, wherein:  
the LAN is an IP network; and  
10 the incoming and outgoing datagrams include an IP address.

26. The local base station of claim 21, wherein:  
a plurality of other local base stations are coupled to the LAN and each  
has a unique address on the LAN;  
15 a plurality of mobile devices are each covered by one of the other local  
base stations; and  
the one or more software modules also track one or more of the plurality  
of mobile devices by logging the unique address of the other local base station  
covering each of the tracked mobile devices.

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27. The local base station of claim 26, wherein the one or more software modules also ensure that more than one of the plurality of mobile devices do not simultaneously transmit an incoming RF signal to the local base station.

5 28. The local base station of claim 26, further comprising:

a memory device coupled to the central processing unit in which the software module logs the unique address of the other local base station covering each of the tracked mobile devices.

10 29. The local base station of claim 21, wherein the local base station covers a plurality of mobile devices.

30. The local base station of claim 29, wherein the one or more software modules also track the plurality of mobile devices covered by the local base station.

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31. The local base station of claim 30, further comprising:

a memory device coupled to the central processing unit in which the one or more software modules log the plurality of mobile devices covered by the local base station.

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32 The local base station of claim 21, wherein the one or more software modules  
also generate system messages for transmission to the mobile device.

33 The local base station of claim 21, wherein the one or more software modules  
5 also maintain a queue of packets of data to be directed over the LAN.

34. The local base station of claim 21, wherein the one or more software modules  
also repeatedly instruct the network interface card to transmit the outgoing  
datagram to the LAN until a signal is received indicating that the outgoing  
10 datagram has been received by another local base station.

35. The local base station of claim 21, wherein the one or more software modules  
also repeatedly instructs the sound card to transmit the outgoing modulated RF  
signal until a signal is received indicating that the mobile device has received the  
15 modulated RF signal.

36. The local base station of claim 21, wherein the one or more software modules  
also coordinate the receipt and transmission of the outgoing and incoming RF  
signals to and from the sound card.

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37. The local base station of claim 21, wherein the one or more software modules also coordinate the receipt and transmission of outgoing and incoming datagrams to and from the LAN.

5 38. The local base station of claim 21, wherein the one or more software modules comprise:

a transmit module that encodes the data packet into the outgoing frame of data;

10 a receive module that extracts the packet of data from the incoming RF signal;

a link manager module that coordinates the receipt and transmission of the outgoing and incoming RF signals to and from the sound card;

a main dispatcher module that coordinates the receipt and transmission of outgoing and incoming datagrams to and from the LAN; and

15 a link module that encodes the packet of data into the outgoing datagram and extracts the data packet from the incoming datagram.

39. A method of routing a message from a first mobile device to a second mobile device in a wireless communication system, comprising the steps of:

20 transmitting the message from the first mobile device;

receiving the message at an A-Node base station, wherein the A-Node base station is one of a plurality of local RF base stations that are coupled to a local area network (LAN);

5        locating the second mobile device by accessing a subscription server that includes a log of a plurality of mobile devices having access to the wireless communication system and the local RF base station covering each of the plurality of mobile devices;

10        sending the message over the LAN to a B-Node base station, wherein the B-Node base station is the local RF base station covering the second mobile device;

transmitting the message from the B-Node base station; and  
receiving the message at the second mobile device.

40. The method of claim 39, wherein the step of locating the second mobile  
15        device is preceded by the additional steps of:

verifying that the first mobile device has a valid subscription to the wireless communication system; and

if the first mobile device does not have a valid subscription to the wireless communication system, then skipping the remaining steps.

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41. The method of claim 40, wherein the step of verifying that the first mobile device has a valid subscription to the wireless communication system is performed by accessing the subscription server.

5 42. The method of claim 40, wherein the step of verifying that the first mobile device has a valid subscription comprises the steps of:

accessing a subscription list on the A-Node base station to verify that the first mobile device has a valid subscription to the wireless communication system, wherein the subscription list includes a log of the mobile devices last known to be  
10 within coverage; and

if the first mobile device is not logged in the subscription list, then accessing the subscription server to verify that the first mobile device has a valid subscription to the wireless communication system.

15 43. The method of claim 40, wherein the step of verifying that the first mobile device has a valid subscription comprises the steps of:

accessing a subscription list on the A-Node base station to verify that the first mobile device has a valid subscription to the wireless communication system, wherein the subscription list includes a log of the mobile devices last known to be  
20 within coverage; and

if the first mobile device is not logged in the subscription list, then (a) accessing the subscription server to verify that the first mobile device has a valid subscription to the wireless communication system, and (b) updating the subscription list to include a record for the first mobile device.

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44. The method of claim 39, wherein each local RF base station includes a subscription list that comprises a log of the mobile devices last known to be within coverage.

10 45. The method of claim 44, wherein the step of transmitting the message from the B-Node base station, is preceded by the additional step of:

verifying that the second mobile device is currently covered by accessing a subscription list located on the B-Node base station, wherein the subscription list includes a log of the mobile devices within coverage.

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46. The method of claim 39, wherein the step of sending the message over the LAN is followed by the additional step of:

returning an acknowledgement signal over the LAN to the A-Node base station, wherein the acknowledgement signal indicates that the message was

20 successfully delivered over the LAN.

47. The method of claim 39, wherein each local RF base station includes a route cache that comprises a log of the local RF bases stations covering one or more of the mobile devices.

5 48. The method of claim 47, wherein:

the step of locating the second mobile device by accessing a subscription server is preceded by the additional step of accessing the route cache of the A-Node base station to locate the second mobile device; and

the subscription server is only accessed to locate the second mobile device  
10 if the B-Node base station is not logged in the route cache of A-Node base station.

49. The method of claim 47, wherein the step of transmitting the message from the B-Node base station is followed by the additional step of:

updating the route cache of the B-Node base station to indicate that the A-  
15 Node base station is covering the first mobile device.

50. A method of routing a message from a first mobile device to a second mobile device in a wireless communication system, comprising the steps of:

transmitting the message from the first mobile device;

receiving the message at an A-Node base station, wherein the A-Node base station is one of a plurality of local RF base stations that are coupled to a local area network (LAN);

accessing an A-Node route cache on the A-Node base station to locate the  
5 second mobile device, wherein the A-Node route cache includes a log of the local RF bases stations covering one or more of a plurality of mobile devices;

if the A-Node route cache does not include the local RF base station covering the second mobile device, then accessing a subscription server to locate the second mobile device, wherein the subscription server includes a log of the  
10 plurality of mobile devices having access to the wireless communication system and the local RF base stations covering each of the plurality of mobile devices;

sending the message over the LAN to a B-Node base station, wherein the B-Node base station is the local RF base station covering the second mobile device;

15 determining whether the second mobile device is active;

if the second mobile device is active, then transmitting the message from the B-Node base station;

if the second mobile device is not active, then (a) sending a communication to an electronic mailbox accessible by the second mobile device  
20 that indicates that the message is waiting, (b) waiting until the second mobile



device becomes active, and (c) transmitting the message from the B-Node base station; and

receiving the message at the second mobile device.